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NEW FUNDAMENTAL FREQUENCY STANDARD

The bureau has recently installed equipment which materially advances the accuracy of the frequency standard. The new equipment comprises essentially a group of four piezo oscillators, each having the frequency 100 kilocycles. Three are alternative standards, the fourth is a reference point against which to check the others. Beats between each of the first three and the fourth are automatically counted by three telephone message registers. An automatic camera takes a picture of the counters each 1,000 seconds, from which record the number of beats per 1,000 seconds of each standard against the reference point can be obtained. In 1,000 seconds each oscillator makes 100,000,000 oscillations, so that variations in frequency within the group can be measured to 1 part in 100,000,000.

To obtain the absolute frequency, the output of one oscillator is fed into a submultiple generator from which currents of 10 kc and 1 kc may be drawn, these frequencies being as accurate as the original oscillations. The 1 kc frequency drives a synchronous motor clock, which is geared to keep exact mean solar time when the input frequency is exactly 1,000 cycles.

The rate of the clock is obtained by checks with Arlington time signals. The percentage gain or loss then is numerically equal to the deviation of the oscillator from 100 kc; that is, if

the clock gained 1 second per day, it would be fast 1 part in 86,400, so the frequency of the piezo oscillator is 100,001.16 cycles per second.

The crystals are of 30° cut and vibrate on a thickness frequency. They are doughnut shaped, that shape being chosen as giving a low temperature coefficient. The temperature and atmospheric pressure in which the crystals operate are carefully regulated, as are the filament and plate voltages. Stand-by batteries take care of power failures.

Measurements show that the average short-time variations of each of the crystals are less than 1 part in 10,000,000. The standard maintains an absolute value of frequency which is known to 1 part in 10,000,000.

AERONAUTIC RADIOBEACON IMPROVEMENTS

Recent work at the bureau has led to improvements in the characteristics of the vibrating reed course indicator, resulting in a 20 per cent increase in sensitivity and at the same time reducing the required constancy to which the modulation frequencies at the beacon station must be held. A variation of ± 0.75 per cent in these frequencies is now permissible. These improvements have been obtained through the use for the reed material of a high-permeability nickel-steel alloy, called "A" metal, rather than elinvar, which was previously employed.

A small filter unit was designed permitting the simultaneous connection of

the reed indicator and the head telephones in the receiving set output without materially affecting the performance of the reed indicator. This unit operates to reduce to a negligible degree the low-frequency hum heard in the ear phones when visual type beacon signals are received. It, therefore, permits the pilot to wear the head telephones while the reeds are in operation, if desired, so that when the visual range beacon is interrupted for transmitting a radiotelephone broadcast the pilot will hear the broadcast begin.

A receiving set installation was made to permit night flights on the College Park beacon. On one night flight, made from College Park, Md., to Philadelphia, Pa., and return, no course variations were observed. The distance from College Park to Philadelphia is 115 miles. In a number of previous tests made on the ground at Media, Pa., 105 miles from College Park, some perceptible night course variations had been obtained. At a distance of 200 miles from College Park, on the ground at Boonton, N. J., large variations have been observed, which might seriously limit the usefulness of the beacon at night at this distance. The result of the night test flight to Philadelphia appeared to show that variations in the air are less than ground tests indicate. A series of night flights are planned to secure more data on dependable distance ranges at night.

TENTATIVE PROGRAM OF THE TWENTY-THIRD NATIONAL CONFERENCE ON WEIGHTS AND MEASURES

The program of the Twenty-Third National Conference on Weights and Measures, to be held in Washington on June 3 to 6, inclusive, promises to be fully up to former standards as to the importance and variety of the items. The following outline of accepted assignments will serve to illustrate the constructive character of the matters to be considered.

The Assistant Secretary of Commerce, Hon. Julius Klein, will address the conference at its third session on Wednesday morning June 4 while the program of the opening session on Tuesday, June 3, will follow those of former meetings, with an address by the president of the conference, Dr. George K. Burgess, and with the reports of State delegates and representatives of State associations of weights and measures officials. At the afternoon session on Tuesday the question of grease-measuring devices will be given further consideration; the committee on specifications and tolerances expects to recommend a minor amendment to the code adopted last year, and the

recommended effective date for this code will be reconsidered in the light of present conditions in the equipment manufacturing industry.

On Wednesday morning the committee on specifications and tolerances will present to the conference a proposed code for odometers; last year it was decided by the conference that this subject should be given consideration. The afternoon of the second day will be devoted to a tour of the laboratories of the National Bureau of Standards. New delegates, who may be in attendance this year for the first time, will find the trip through the bureau well worth while.

A series of papers dealing in general with the marketing of petroleum products is scheduled for Thursday. These will include papers on air releases for power-operated meter units, vehicle-tank meters used in the sale of gasoline and fuel oil, special set-ups for testing vehicle tank compartments, and a new development of household fuel-oil meters. As an important feature of this consideration of meters, all manufacturers of gasoline meters have been invited to present their devices to the conference, to disassemble them, to show how they operate, and to explain the use of any adjustable devices with which they are equipped. The great interest which weights and measures officials continue to evince in the subject of meters made it appear well worth while to include this demonstration on the program. The committee on specifications and tolerances may also have some recommendations to make relative to the code for liquid-measuring devices and other codes formerly adopted by the conference. This committee has likewise been considering a new code for automatic-indicating scales, and if this can be placed in shape for action this year, it will probably be presented on Thursday. The regular "business" items will come up at the closing session on Friday, as formerly, but in addition there will be the usual number of papers at this session.

Program items not yet assigned to particular sessions include the following: Log Rules, by A. W. Corwin, of Allegany County, N. Y.; Annual Reports, by H. S. Jarrett, of West Virginia, and H. D. Hubbard, of the National Bureau of Standards; Net Weights and Standardization in the Sale of Cotton, by A. W. Palmer, cotton specialist of the United States Department of Agriculture; an address by C. P. Norgord, assistant commissioner of agriculture and markets of New York; a further discussion of the standard container act of 1928, with particular reference to a pro-

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posed amendment to this act designed to correct certain unintended requirements of the present statute. Numerous other technical and general papers are in contemplation, but announcement of them is withheld pending acceptance of the assignments by the speakers selected.

All weights and measures officials, both State and local, are urged to attend the national conference. Manufacturers of weighing and measuring devices are also invited to participate in the conference, and their representatives and those of weighing departments, chambers of commerce, railroads, industrial concerns, and other organizations interested in the activities of the conference will be welcomed to the meetings.

MEETING OF AMERICAN PHYSICAL SOCIETY

The one hundred and sixty-third regular meeting of the American Physical Society was held in Washington April 24 to 26, inclusive. Sessions of the first two days were held at the National Bureau of Standards and on the last day at the National Academy of Sciences.

Five papers were presented by members of the bureau's staff, as follows:

1. The Mechanism of Atomization, by R. A. Castleman; a new theory which appears to explain the process of liquid "atomization" is satisfactorily set forth.

2. Wind Pressure on Cylindrical Stacks, by H. L. Dryden and G. C. Hill, in which a summary was presented of published model experiments on the wind pressure on cylinders and of some additional experiments on model cylinders in the wind tunnel, on a large cylinder in natural wind, and on the stack of the bureau's new power plant in natural wind.

3. Airfoils of Circular-Arc Section for Use at High Speeds, by L. J. Briggs and H. L. Dryden, in which experiments are described showing that the airfoil sections used in the design of airplane propellers change their aerodynamical properties as the relative airspeed approaches the speed of sound.

4. Regularities in the Spectra of Lutecium, by W. F. Meggers and B. F. Scribner, in which the recent analysis of the lutecium spectra and the separation of the lines into three distinct classes are described. (See Technical News Bulletin No. 156, p. 32; April, 1930.)

5. Time Lag in Changes of Electrical Properties of Rubber with Temperatures and Pressure, by A. Scott, in which it is shown that when the temperature of

rubber is suddenly changed the electrical properties do not at once assume their final values. Two hours or more may be required for the dielectric constant, power factor, and resistivity to become constant.

MEETING OF SEISMOLOGICAL SOCIETY OF AMERICA

On May 5 and 6 the eastern section of the Seismological Society of America held its annual meeting in Washington as a joint meeting with the seismology section of the American Geophysical Union. The meeting on May 5 was held at the National Bureau of Standards and on May 6 at Georgetown University.

In addition to the usual business meeting, the session at the bureau on the morning of May 5 included an address of welcome by Dr. George K. Burgess; a paper on engineering seismology in Japan, by Charles W. Brown, with notes and comments by R. R. Martel; a discussion of the need of additional seismological data by structural engineers, by John R. Freeman; and a paper on the relation between the engineering and the seismological attack on the earthquake problem, by N. H. Heck.

Luncheon was served at the bureau, and in the afternoon seven additional papers were presented, including one on the coordination of seismological investigation in the United States, by Dr. R. S. Patton, Director of the United States Coast and Geodetic Survey.

The session at Georgetown University included a business meeting, election of officers, and the presentation of additional papers. Those attending the meeting inspected the Georgetown Seismograph Station, where the late Father Tondorf did so much valuable work.

DETERMINATION OF OSMIUM

Further work indicates that the incomplete recovery of osmium, referred to in earlier reports on the development of a method for the determination of osmium (Technical News Bulletin No. 156, p. 32; April, 1930), is caused by the presence of a small amount of sulphuric acid formed by the oxidation of the sulphur dioxide which is used to reduce the osmium tetroxide. When the absorbing solution is evaporated to dryness to expel hydrochloric acid and sulphur dioxide, and to convert complex sulphites of osmium to the chloride, the presence of the sulphuric acid appears to cause a slight volatilization of osmium tetroxide.

EFFECT OF BORIC ACID ON THE CLINKERING OF PORTLAND CEMENT

An investigation to determine the possibility of producing a well-burned clinker at a relatively low temperature, by the use of a small quantity of boric acid as a flux, was begun several months ago. The energy changes which take place during burning were studied by means of heating curves. A study of these curves led to a brief investigation of the various constituents normally present in Portland cement.

Heating curves of mixtures of CaCO_3 and SiO_2 in the ratio of $2\text{CaO}:\text{SiO}_2$ gave evidence of (1) an exothermic reaction at about $1,420^\circ\text{C}$., and (2) an endothermic reaction immediately following, and probably starting before the first reaction is finished. The first is thought to be the formation of $2\text{CaO}.\text{SiO}_2$ as no indication of it is found on the cooling curve, or upon reheating. Heating curves of $2\text{CaO}.\text{SiO}_2$ clinker fail to show this break.

The second reaction is reversible, and is probably the inversion of beta $2\text{CaO}.\text{SiO}_2$ to the alpha form, as the temperature at which it occurs corresponds with the generally accepted temperature for this transition.

The first reaction is not affected by the addition of small quantities of boric acid to the raw mixture, but the second was found to occur at progressively lower temperatures with increasing amounts of boric acid. The refractive indices of the clinkers were also lowered by the addition of boric acid, and from these two facts it is held possible that some of the boric acid forms a solid solution with the silicate.

Mixtures of CaO , SiO_2 , Al_2O_3 , Fe_2O_3 , and MgO approximating the composition of Portland cement, gave curves similar to those for the $\text{CaO}.\text{SiO}_2$ mixtures. The exothermic break came at about $1,300^\circ\text{C}$. in these mixtures. The addition of boric acid had little apparent effect on the shape of the curves. The clinkers containing boric acid, however, were better burned than those without boric acid. Contrary to expectation, the clinkers containing boric acid also had a higher percentage of free lime than the others.

It is planned to make a systematic study of the portion of the ternary system $\text{CaO}.\text{SiO}_2.\text{B}_2\text{O}_3$ in the region between $\text{CaO}.\text{SiO}_2$, $3\text{CaO}.\text{SiO}_2$, and 5 per cent B_2O_3 , in order to interpret the phenomena already observed as well as to obtain additional information. Other systems may be studied later, if it appears advisable.

HEAVY CLAY INVESTIGATION

This investigation is being conducted at the Columbus branch of the bureau and has for its object the determination of the properties which characterize a number of representative Ohio State clays used primarily in the manufacture of so-called heavy clay ware, which includes brick, hollow tile, paving block, etc. The first news item on the investigation was published in Technical News Bulletin No. 154 (February, 1930) and presents the mineralogical composition of 27 days. The present report presents values obtained in determining the softening points of the clays. The values are given in terms of pyrometric cones (P. C. E. or pyrometric cone equivalent value). The values found are as follows:

Type of material	P. C. E. value	Type of material	P. C. E. value
Shales:		Glacial—Continued.	
Allegheny, Malvern.....	9	Mount Healthy.....	11
Allegheny, New Lexington.....	8	New London.....	5-6
Bedford, Columbus.....	7-8	Toledo.....	03-02
Chagrin, Cleveland.....	5	Upper Sandusky.....	2-3
Cincinnati, Cincinnati.....	1-2	Alluvial:	
Connemaugh, Ava.....	8-9	Beaver.....	9
Connemaugh, Summitville.....	8-9	Gallipolis.....	10
Dunkard, Marietta.....	4-5	Mowrystown.....	12
Pottsville, Portsmouth.....	13	Rutland.....	4-5
Waverly, Waverly.....	10-11	Sugar Creek.....	8
Glacial:		Westerville.....	11
Findlay.....	5-6	Zanesville.....	6
Lima.....	1	Zanesville (loess).....	12
London.....	5-6		

PURE IRIIDIUM

Two lots of iridium which are being purified were subjected to several fractional precipitations with hydrogen sulphide. Small samples were taken at several stages and subjected to spectrographic examination. The results indicate that the concentrations of all platinum metal impurities decrease with repeated treatments with hydrogen sulphide. In one of the iridium solutions platinum seems to have been practically eliminated, and ruthenium is present in very small amounts. The other solution is still somewhat less pure, but the elimination of platinum and ruthenium seems to be progressing. Palladium has been eliminated from both solutions. Rhodium is the most difficult of the platinum metals to eliminate by this method.

SPECIFICATIONS FOR ROOFING SLATE

A few months ago this bureau was called upon by the Federal Specification Board for information on roofing slate to form the basis of a specification for this material. After a study of the data available it was concluded that the information on weathering qualities was too meager, and the significance of various tests in this connection was not thoroughly understood. It was decided, therefore, to make a study of weathered slates which had been in service for a considerable period of time to determine what weathering agents are mostly concerned in the destruction of slate roofs and what qualities in slate are most effective in resisting such destructive agents. Several hundred samples were collected, some of which had been on roofs for more than 100 years. These were carefully studied to determine what alterations had taken place, especial attention being given to the decayed portions.

Slate, being a metamorphosed clay sediment, is composed largely of chemically stable elements. It is a very dense material with a higher flexural strength than any other common type of rock. With such properties it might be expected to be almost immune to weathering effects. Nevertheless it is evident that some slates can not be depended upon for more than 30 years of service on a roof.

Frost action, which is commonly assumed to be very destructive to masonry, has been found to play a very small part in the weathering of slate. The decay of slate on a roof is confined mainly to

the covered portions of the shingles and manifests itself by a slow process of crumbling and scaling in thin layers. Chemical and petrographic examination of the decayed portions reveal the presence of considerable calcium sulphate, although this compound is almost totally absent in the fresh slate. Some slates contain as much as 4 per cent of calcium carbonate which could be converted to calcium sulphate by rainwater bearing traces of sulphuric acid. This led to experiments on slate which involved a soaking in very dilute sulphuric acid. Such tests on slates containing appreciable amounts of calcium carbonate caused a surface action similar to that shown on badly weathered slates, but underneath the thin layers so affected the slate was still sound. This seemed to indicate that the action of sulphuric acid is not the only agent concerned in slate weathering.

Evidence of a hydration process has been found, and is being investigated. Soaking and drying tests have shown that some slates can be destroyed in 20 or 30 cycles of such treatment. While it is probably too early to draw conclusions, it seems likely that the hydration effects go hand in hand or, perhaps, precede the decomposition of carbonates.

PROPERTIES OF FIBER-INSULATING BOARDS

The bureau has tested various fiber insulating boards, representative of different commercial types as regards both structure and fiber components. The boards were composed variously of fibers from wood, cornstalks, licorice root, and sugarcane (bagasse). The results of the tests are given in the table. Following are the more important details of the tests applied. For further details the report of the bureau's previous study of fiber wall boards may be consulted. (A Study of Fiber Wall Boards for Developing Specification Standards, Paper Trade Journal, Vol. 89, No. 13, p. 61; Sept. 16, 1929.)

The behavior of the boards in humid air was determined as follows: Specimens were cut from each material 3 by 12 inches, the longer dimension being crosswise of the board in all cases where crosswise direction of the board was known. The specimens were conditioned for 72 hours at approximately 30 per cent relative humidity, and then for a like period of time in saturated water vapor. The increase in length, weight, and thickness as a result of absorption of moisture was determined. Each result given is the average of five tests.

There was not much variation in the individual tests for a given material.

The flexural strength of the boards was determined by the following method: Specimens 3 by 14 inches were cut from each board, and since the machine and crosswise directions of these boards were not known, five samples were cut in each direction and designated as the long and short directions of the board. The strength tests were made on a ten-

sile testing machine equipped with an attachment for determining the flexural strength. The results listed are the loads required to break the boards based on the average of five tests in each direction of the board. The deflection was measured at the time of rupture. The individual test results on these boards are very consistent, for the average deviation from the average of the five tests is less than 5 per cent.

Tests of fiber insulating boards

B. S. No.	Density at 30 per cent R. H.	Weight at 30 per cent R. H.	Thickness at 30 per cent R. H.	Effect in saturated water vapor			Flexural strength ¹		Deflection at rupture	
				Increase in weight	Expansion		Length	Width	Length	Width
					Width of board	Thickness of board				
	G/cm. ³	Lbs./1,000 ft. ³	Inch	Per cent	Per cent	Per cent	Pounds	Pounds	Inch	Inch
311001.....	0.34	866	0.45	10.1	0.23	6.2	13.4	12.2	0.70	0.80
311002.....	.26	603	.44	13.8	.26	5.0	9.8	9.5	.65	.80
311003.....	.29	687	.45	16.3	.38	7.1	17.2	13.4	.70	.80
311004.....	.32	745	.45	12.4	.54	5.5	13.3	9.2	.70	.80
311005.....	.22	595	.44	14.9	.47	6.4	12.8	10.0	.60	.70
414031.....	.27	626	.44	17.6	.55	-----	14.6	14.2	.50	.60
Average.....	.28	677	.44	14.2	4.1	6.0	13.5	11.4	.64	.75

¹ Rupturing load at midspan of a specimen 3 inches wide and making a 12-inch span between supports.

PAPER BAGS AS SHIPPING CONTAINERS

Paper bags are being widely used as shipping containers, since they possess the desirable features of strength, non-sifting of contents, water and vermin resistance, and economy. The most common type is the multiple-wall bag, composed of kraft paper made water resistant by rosin sizing, and having a self-closing valve through which the material is introduced. This type of bag is in extensive use for cement and other similar materials, and has proved economical not only in respect to its cost, but also in respect to breakage and protection of the contents.

There is considerable interest in the possibility of extending the use of bags of this type to other materials which must be well protected from moisture. Difficulties have been experienced with substances which absorb water readily, such as quicklime and sugar. In long shipments or in storage, quicklime absorbs sufficient moisture from the air to burst the bag through the swelling of the lime. From the same cause, sugar sometimes becomes so lumpy as to have its sales value considerably decreased.

On the other hand, in many chemical preparations and food products the avoidance of loss of moisture is desired. For these purposes the ordinary type of bag has proved unsatisfactory as it is not sufficiently impervious to air.

Recent tests of sheathing papers indicated that there are papers available which are sufficiently impervious to air and which have the other necessary qualifications for bag use, such as strength, flexibility, water resistance, and lack of odor. The results of tests of these papers were reported in Bureau of Standards Journal of Research, Vol. 3, No. 1, p. 75; July, 1929 (Research Paper No. 85, price 5 cents, from the Superintendent of Documents, Government Printing Office, Washington, D. C.). Two of these papers appear to be particularly suitable. One, designated in the publication as 2 L, is made of three plies of oiled kraft paper cemented together with two layers of asphalt. The other, designated 8 L, is made of two plies of kraft, with an inner ply of zinc foil, all cemented together with asphalt. Paper of the latter type costs about twice as much as that of the type first mentioned, but is practically impervious to air.

Other considerations of importance are strength and means of sealing the bags so as to have air-tight joints. Tests of the air-tightness of bags could be made by exposing bags filled with quicklime or other hygroscopic material to a moisture-saturated atmosphere. For testing walls and ends an impervious container filled with hygroscopic material, and provided with an open end and means for fastening on a diaphragm of the material to be tested, could be used. Change of weight per unit time would give the desired measurement rapidly. Strength could be determined by the "drop test" which is commonly applied by dropping filled bags until they burst, and noting the number of drops the bag withstands. There should be no difficulty in meeting all strength requirements, as papers reinforced by textile fabrics are available if required.

Research along the lines indicated would no doubt result in the development of more satisfactory containers for a wide variety of materials. The potential savings that could be effected are considerable.

PREVENTION OF ACCIDENTS IN THE HOME

For many years the National Bureau of Standards has been actively interested in the prevention of accidents in the home. In 1918 the bureau published its Circular No. 75, entitled "Safety for the Household," which has received wide distribution. This circular covers such general subjects as accidents from electricity, lightning, gas, fire, chemicals, and miscellaneous hazards, resulting in falls, cuts, scalds, burns, etc. This circular is now in process of revision.

The General Federation of Women's Clubs is cooperating with the bureau by conducting a survey in the homes of its members to obtain first-hand information on accidents which have occurred in these households. At present a survey of the homes of club members in North Carolina is in progress and the results will be reported at the biennial convention in June. Upon the completion of this survey the federation proposes to make similar ones in other States, and also is planning a campaign which will stimulate women all over the country to take certain precautions which are often overlooked, and also to take a more active part in accident prevention in the future.

Accidents in the home are responsible for about one-quarter of the total fatalities from accidental causes, or about 25,000 deaths per year. These accidents are of many kinds, but falls constitute

about 40 per cent of them, while burns, scalds, and injuries from explosions are the next most numerous type and account for one-quarter of the deaths. These are the kind of accidents which should, therefore, receive most attention from those who are trying to promote household safety. Many of the accidents which are daily taking place are undoubtedly preventable. Estimates differ as to just what proportion of these accidents can be eliminated by reasonable care on the part of those involved, but it seems certain that there is justification for the slogan "Accidents don't happen—they are caused."

ZONING ORDINANCES

According to a recent survey made by the division of building and housing, zoning ordinances were in effect in 856 cities, towns, villages, and counties throughout the United States on January 1, 1930. These zoned municipalities contain more than 39,000,000 people or a number equal to three-fifths of the urban population of the United States. Zoning authority has been conferred upon municipalities in 47 States and the District of Columbia, while in the forty-eighth State, Washington, cities of the first class have authority to enact zoning regulations under general home-rule provisions of the State constitution.

A mimeographed report based on the above survey shows that during the past two years 183 municipalities and counties adopted zoning ordinances, while 127 others either amended or revised zoning ordinances previously adopted. During the same period five cities, namely, Cleveland, Dallas, New Orleans, Spokane, and Youngstown, each having over 100,000 population, were zoned, making a total of 60 of the 68 largest cities having zoning ordinances in effect.

An examination of the 183 zoning ordinances adopted during the past two years shows that 130 are comprehensive in scope, and of the 127 revised and amended ordinances 108 are comprehensive. There is a constant increase in the percentage of comprehensive measures over those of other types.

The States rank in the following order as to the number of zoned municipalities: New York, 143; New Jersey, 104; California, 80; Illinois, 78; Massachusetts, 68; Pennsylvania, 57; Ohio, 46; Michigan, 38; Wisconsin, 30; Kansas, 23; Indiana, 21; Connecticut, 18; Iowa, 14; Florida, 13; Missouri and Virginia, 10 each; Rhode Island, 9; Colorado and Oklahoma, 8 each; Nebraska, 7; North Carolina, 6; Georgia and North Dakota, 5 each; Alabama, Maryland, South Da-

kota, Tennessee, Texas, and Washington, 4 each; Idaho, Minnesota, New Hampshire, Oregon, and Utah, 3 each; Arizona, Arkansas, Kentucky, Louisiana, and Maine, 2 each; and Delaware, District of Columbia, Mississippi, Nevada, South Carolina, and Wyoming, 1 each.

The report shows that legislation during the past two years took the form of constitutional amendments; general zoning enabling acts; charters and charter amendments; home-rule charter amendments; regional, county, and township zoning; and special enactments of various sorts, as, for example, the control and the location of gasoline stations.

Nine legislatures based their zoning enactments during 1928 and 1929 either in whole or in part upon the text of Building and Housing Publication No. 5, A Standard State Zoning Enabling Act, published by the Bureau of Standards in 1923, as the result of a special survey by an advisory committee on city planning and zoning. There are now 35 States that have used the standard act in the enactment of 54 zoning laws.

Copies of the mimeographed report, entitled "Survey of Zoning Laws and Ordinances Adopted During 1928 and 1929," may be obtained by writing the division of building and housing, National Bureau of Standards, Washington, D. C. Copies of BH-5 may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 5 cents each.

UNIFORM MECHANICS' LIEN ACT

At a meeting of the Standard State Mechanics' Lien Act Committee on March 17, complete agreement was reached on the principles of the proposed uniform act. This is the culmination of five years of effort, during which period it often appeared that no satisfactory solution of the many points at issue could ever be reached.

The major points of difference in committee for some months have been the division of responsibility among the various groups in action to be taken by lienors other than laborers to establish the right of lien protection and in the proper distribution of contract funds. There has been also the question of whether the owner and contractor should be permitted by contract to bar all lien rights.

The committee determined that lienors other than laborers should serve notice upon the owner within a limited time after beginning performance in order to establish lien rights against the full contract price and that such lienors might, after such limited period, serve the notice with the effect of entitling them to a

pro rata share of funds then in the owner's hands. The so-called no-lien section was eliminated from the act.

The redrafting of the act, in accordance with the principles decided upon, is going forward with a view to its presentation for review to a joint meeting of the department's committee and the Mechanics' Lien Act Committee of the National Conference of Commissioners on Uniform State Laws on May 7.

CONSTRUCTION ACTIVITY DURING FEBRUARY, 1930

The value of construction contracts in 37 States amounted to \$317,053,000 in February, 1930, according to reports of the F. W. Dodge Corporation. In comparison with awards valued at \$361,273,900 in February, 1929, there was a decline of 12 per cent, and this February was also lower than in 1928 and 1927 by 32 and 19 per cent, respectively. Contracts for residential buildings were 42 per cent less, but all other classes of construction combined showed an increase of 5 per cent. Contracts for public works and utilities increased 49 per cent.

NEW AND REVISED PUBLICATIONS ISSUED DURING APRIL, 1930

Journal of Research¹

Bureau of Standards Journal of Research, Vol. 4, No. 4, April, 1930 (RP Nos. 160 to 166, inclusive). Obtainable only by subscription. See footnote.

Bureau of Standards Journal of Research, Vol. 4, No. 5, May, 1930 (RP Nos. 167 to 175, inclusive). Obtainable only by subscription. See footnote.

Research Papers¹

(Reprints from Journal of Research)

RP151. Heat capacities in some aqueous solutions; F. D. Rossini. Price, 5 cents.

RP154. A 12-course radio range for guiding aircraft with tuned reed visual indications; H. Diamond and F. G. Kear. Price, 10 cents.

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RP155. Applying the radio range to the airways; F. G. Kear and W. E. Jackson. Price, 5 cents.

RP156. New piezo oscillations with quartz cylinders cut along the optical axis; A. Hund and R. B. Wright. Price, 20 cents.

RP158. Engine-ignition shielding for radio reception in aircraft; H. Diamond and F. G. Gardner. Price, 15 cents.

Circulars¹

C381 (supersedes 3d ed. of C40). Sodium oxalate as a standard in volumetric analysis. Price, 5 cents.

Simplified Practice Recommendations¹

SPR90-29 (2d ed.). Hack-saw blades. Price, 10 cents.

SPR109-29. Refrigerator ice compartments. Price, 10 cents.

Commercial Standards¹

CSO-30. The commercial standard service and its value to business. Price, 10 cents.

CS17-30. Diamond core drill fittings. Price, 10 cents.

Miscellaneous Publications¹

M107. Safety code for brakes and brake testing. Price, 5 cents.

Commercial Standards Monthly¹

Commercial Standards Monthly, Vol. 6, No. 10, April, 1930. Obtainable only by subscription. See footnote.

Technical News Bulletin¹

TNB157. Technical News Bulletin, May, 1930. Obtainable only by subscription. See footnote.

OUTSIDE PUBLICATIONS²

In this list are included, in so far as possible, all articles by members of the bureau's staff on scientific and technical subjects. Some of these articles are written in the author's unofficial capacity only and deal with subjects outside the field of the National Bureau of Standards. The article itself should al-

ways be consulted to determine whether or not it expresses the official opinion of the bureau.

Shielding aviation engines to aid radio reception on planes. H. Diamond and F. A. Gardner; United States Daily (Washington, D. C.), Vol. V, No. 41, p. 6; April 19, 1930.

Neon signs. M. G. Lloyd; Proceedings, First Annual Meeting of the Southern Section, International Association of Electrical Inspectors (Atlanta, Ga.), p. 113; October 15 and 16, 1929.

Recent developments of window materials and fabrics for transmitting ultraviolet radiation. W. W. Coblenz; Transactions of the Illuminating Engineering Society (New York, N. Y.), Vol. XXV, No. 4, p. 359; April, 1930.

The precise measurement of X-ray dosage. L. S. Taylor; Radiology (Chicago, Ill.), Vol. XIV, p. 372; April, 1930. This is a reprint from Bureau of Standards Journal of Research, Vol. 2, No. 4, p. 771; April, 1929; Research Paper, No. 56.

Some improvements in thermo-regulators. H. J. Wing; Analytical Edition, Industrial and Engineering Chemistry (Washington, D. C.), Vol. 2, p. 196; 1930.

Measuring pull of gravity for determining curvature of earth. Paul R. Heyl; United States Daily (Washington, D. C.), Vol. V, No. 36, p. 12; April 14, 1930.

Duration flights during 1929. H. B. Hendrickson; Aero Digest (New York, N. Y.), Vol. 16, No. 4, p. 64; April, 1930.

Tests of welded columns. J. H. Edwards, H. L. Whittemore, and A. H. Stang; United States Construction Magazine (care of United States Daily, Washington, D. C.), p. 6; April 12, 1930.

Discussion of paper by R. L. Templin on the determination and significance of the proportional limit in testing machines. L. B. Tuckerman; Proceedings, American Society for Testing Materials (Philadelphia, Pa.), Vol. 29, Part II, p. 538; 1929.

Discussion of paper by J. B. Johnson and T. T. Oberg on fatigue resistance of some aluminum alloys. L. B. Tuckerman; Proceedings, American Society for Testing Materials (Philadelphia, Pa.), Vol. 29, Part II, p. 344; 1929.

Discussion of paper by J. R. Townsend and C. H. Greenall on fatigue studies of nonferrous sheet metal. L. B. Tuckerman; Proceedings, American Society for Testing Materials (Philadelphia, Pa.), Vol. 29, Part I, p. 503; 1929.

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² "Outside publications" are not for distribution or sale by the Government. Requests should be sent direct to publishers.

- Discussion of report of Committee E-1 on methods of bend testing. L. B. Tuckerman; Proceedings, American Society for Testing Materials (Philadelphia, Pa.), Vol. 29, Part I, p. 503; 1929.
- A study of the bursting strength test. F. T. Carson and F. V. Worthington; Paper Trade Journal (New York, N. Y.), Vol. 90, No. 14, p. 69; April 3, 1930.
- The preparation of fiber test sheets. M. B. Shaw, G. W. Bicking, and L. W. Snyder; Paper Trade Journal (New York, N. Y.), Vol. 90, No. 16, p. 60; April 17, 1930.
- Blistering tendency of some cast irons when enameled. A. I. Krynitsky and W. N. Harrison; Preprint for May, 1930 meeting, American Foundrymen's Association (Urbana, Ill.), April, 1930.
- The status of the double iron-carbon diagram. A. I. Krynitsky; Metals and Alloys (Chemical Catalog Co., New York, N. Y.), Vol. 1, p. 469; April, 1930.
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- The influence of magnesia, ferric oxide, and soda upon the temperature of liquid formation in certain Portland cement mixtures. W. C. Hansen; Paper No. 22, Portland Cement Association Fellowship (care of National Bureau of Standards, Washington, D. C.), January, 1930.
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